	Application No.	Applicant(s)
Notice of Allowability	09/899,843	RIESS ET AL.
	Examiner	Art Unit	
	Kandasamy Thangavelu	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *December 19, 2005*.

2. ☒ The allowed claim(s) is/are *1-22,24-68 and 73-75*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

       1. ☐ Certified copies of the priority documents have been received.

       2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

       3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

       1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

DETAILED ACTION

Introduction

1.   This communication is in response to the Applicants' communication dated

December 19, 2005. Claims 1, 10-19, 22, 23, 38, 50, 52, 58 and 67 were amended.

Claims 1-75 of the application are pending.

Examiner's Amendment

2.   Authorization for this examiner's amendment was given in a telephone interview with

Mr. Robert Hails, Jr. on January 31, 2006.

An examiner's amendment to the record appears below. Should the changes and/or

additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR

1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the

payment of the issue fee.

3.   The application has been amended as follows:

4.   In the claims:

In claim 1, Line 1, "method"

has been changed to

-- method for use in a communication system for transmitting symbols of a high order

constellation--.

In claim 2, Line 5, "decoded symbols adjacent to the candidate sample"

has been changed to

-- estimated symbols adjacent to symbol $d^{\wedge}_n$ --.

In claim 2, Line 6, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 4, Line 6, "samples adjacent to the candidate sample"

has been changed to

-- estimated symbols adjacent to symbol $d^{\wedge}_n$ --.

In claim 4, Line 7, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 10, Line 1, "method"

has been changed to

-- method for use in a communication system for transmitting symbols of a high order

constellation--.

In claim 11, Line 5, "the candidate sample"

has been changed to

-- symbol $d^{\wedge}_n$ --.

In claim 11, Line 6, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 13, Line 4, "an estimated"

has been changed to

-- a decoded --.

In claim 13, Line 6, "the candidate sample"

has been changed to

-- symbol $d^{\wedge}_n$ --.

In claim 13, Line 7, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 19, Line 1, "method"

has been changed to

-- method for use in a communication system for transmitting symbols of a high order

constellation--.

In claim 20, Line 4, "exceeds"

has been changed to

-- is less than or equal to --.

In claim 21, Line 2, "proportional"

has been changed to

-- inversely proportional --.

In claim 22, Line 4, "exceeds"

has been changed to

-- is less than or equal to --.

In claim 22, Line 7, "proportional"

has been changed to

-- inversely proportional --.

Claim 23: canceled.

In claim 25, Line 6, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 26, Line 6, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 27, Line 7, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 30, Line 5, "samples neighboring to sample x_n"

has been changed to

-- estimated symbols neighboring to symbol $d^{\wedge}_n$ --.

In claim 30, Line 7, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 31, Line 5, "samples neighboring to the sample x_n"

has been changed to

-- estimated symbols neighboring to symbol $d^{\wedge}_n$ --.

In claim 31, Line 6, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 32, Line 6, "samples neighboring to sample x_n"

has been changed to

-- estimated symbols neighboring to symbol $d^{\wedge}_n$ --.

In claim 32, Line 7, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 35, Line 5, "samples neighboring to sample x_n"

has been changed to

-- rescattered samples neighboring to rescattered sample y_n --.

In claim 35, Line 6, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 36, Line 5, "samples neighboring to sample x_n"

has been changed to

-- rescattered samples neighboring to rescattered sample y_n --.

In claim 36, Line 6, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 37, Line 6, "samples neighboring to sample x_n"

has been changed to

-- rescattered samples neighboring to rescattered sample y_n --.

In claim 37, Line 7, "a coefficient"

has been changed to

-- a coefficient representing any prior knowledge of intersymbol interference effects--.

In claim 44, Line 1, "equalizer"

has been changed to

-- equalizer for use in a communication system for transmitting symbols of a high order constellation --.

In claim 52, Line 1, "receiver"

has been changed to

-- receiver for use in a communication system for transmitting symbols of a high order constellation --.

In claim 52, Line 11, "detector"

has been changed to

-- detector and the symbol decoder to generate decoded symbols from captured samples using estimated ISI effects --.

In claim 59, Line 2, "the following method to be executed:"

has been changed to

-- a symbol estimation method to be executed in a communication system for transmitting

symbols of a high order constellation, the equalization method comprising: --.

In claim 60, Line 4, "exceeds"

has been changed to

-- is less than or equal to --.

In claim 61, Line 2, "proportional"

has been changed to

-- inversely proportional --.

In claim 62, Line 4, "exceeds"

has been changed to

-- is less than or equal to --.

In claim 62, Line 7, "proportional"

has been changed to

-- inversely proportional --.

Claims 69-72: canceled.

In claim 73, Line 1, "for communication processing system"

has been changed to

-- for use in a communication system for transmitting symbols of a high order

constellation --.

In claim 73, Line 4, "reliable samples"

has been changed to

-- reliable symbols --.

In claim 73, Line 5, "samples"

has been changed to

-- samples, wherein the identifying comprises:

estimating decoded symbols from a sequence of captured samples representing a

communication signal captured at a receiver,

calculating a reliability factor of a candidate sample from values of a plurality of

estimated symbols in proximity to an estimated symbol that corresponds to the candidate sample,

if the reliability factor is less than a predetermined limit, designating the candidate

sample as a reliable symbol--.

A clean copy of allowed claims is attached.

Reasons for Allowance

5.   Claims 1-22, 24-68 and 73-75 of the application are allowed over prior art of record.

6.   The following is an Examiner's statement of reasons for the indication of allowable

subject matter:

The closest prior art of record shows:

(1) systems and methods for communicating radiophone communications over a

radiophone communication channel; methods for achieving a desired bit error rate without

requiring a complex optimal estimating filter; the transfer characteristic of the channel is

estimated from the predetermined pilot symbols and a data sequence including data

corresponding to both the pilot symbols and the communication symbols; the method uses an

iterative estimation of information symbols and the channel characteristic; estimates of

information symbols are generated from previously estimated information symbols and the

newly estimated information symbols are used to generate new estimates of the channel

characteristic; generating a group of information symbols data corresponding to a group of

information symbols adjacent to previously estimated information symbols; the identified group

of symbols is the one for which the estimated error probability is less than a predetermined

threshold (**Hassan,** U. S. Patent 5,901,185);

(2) decoding information symbols from symbol modulated radio signal; the decoder

includes a channel estimator to estimate the coefficients of the channel through which the signal

is propagated; a signal predictor combines the channel estimates with the corresponding samples

of the signal to obtain a likelihood indication; a maximum likelihood sequence estimator is used

to compensate for the ISI effects; the maximum likelihood or viterbi algorithm for decoding an

information symbol modulated signal comprises sampling the signal to obtain samples that each

depend on a limited number of sequential information symbols; the hypothesized sequences are

used to predict the sample value; the method predicts an expected value of signal samples for

each of the hypothesized sequences and compares the actual values of signal samples with the

predicted values of signal samples to determine a likelihood value for each of the sequences; the

decoder comprises a maximum likelihood sequence estimator; a sequence of complex vector

values are produced , each one being a weighted sum of several adjacent complex symbol values;

the weighting factors are channel coefficients determined from the received signals by

correlating with the known symbols included in the transmission (**Dent**, U. S. Patent 6,347,125);

and

(3) a decoding circuit for receivers in mobile communication systems; the method of

estimating the transmitted signal correctly even when the transmitted signal contains much

interference; the decoding circuit contains a reliability measurement unit for calculating the

reliability value of the estimated amplitude and phase in the transmission lines; an interpolation

unit for compensating the phase of information symbols by deciding a method of interpolation on

the basis of reliability; a coherent detection unit which detects the signal using the interpolated

estimation value; a decision unit for identifying the output from the coherent detection unit on

the basis of its phase; the interpolation method is decided based on the reliability; the threshold

supply unit supplies the reliability generation unit with a prescribed threshold; the reliability is

set to 1 when the power from the power calculation unit is greater than the threshold and it is set

to zero when the power is less than the threshold (**Komatsu**, U. S. Patent 6,560,272).

None of these references taken either alone or in combination with the prior art of record discloses a reliable symbol identification method for use in a communication system for transmitting symbols of a high order constellation, specifically including:

(Claim 1) "calculating a reliability factor of a candidate sample from values of a plurality of estimated symbols in proximity to an estimated symbol that corresponds to the candidate sample, and

if the reliability factor is less than a predetermined limit, designating the candidate sample as a reliable symbol".

None of these references taken either alone or in combination with the prior art of record discloses a reliable symbol identification method for use in a communication system for transmitting symbols of a high order constellation, specifically including:

(Claim 10) "calculating a reliability factor of a candidate sample from values of a plurality of decoded symbols in proximity to the candidate sample,

if the reliability factor is less than a predetermined limit, designating the candidate sample as a reliable symbol".

None of these references taken either alone or in combination with the prior art of record discloses an equalization method for use in a communication system for transmitting symbols of a high order constellation, specifically including:

(Claim 19) "revising the ISI coefficients based on the decoded symbols and

corresponding received sample values, wherein the contribution of each symbol-sample pair is

weighted according to reliability factor of the respective captured sample".

None of these references taken either alone or in combination with the prior art of record

discloses an equalizer for use in a communication system for transmitting symbols of a high

order constellation, specifically including:

(Claim 44) "an ISI estimator having a first input coupled to the symbol decoder output, a

second input coupled to the first input of the symbol decoder and an output for the estimated ISI

coefficients, wherein the ISI estimator estimates ISI coefficients based on the decoded symbols

and corresponding received sample values, each symbol-sample pair being weighted according

to reliability factor of the respective captured sample".

None of these references taken either alone or in combination with the prior art of record

discloses a receiver for use in a communication system for transmitting symbols of a high order

constellation, specifically the process including:

(Claim 52) "a processor coupled to the memory by a communication path, the processor

logically organized as a reliable symbol detector, an ISI estimator and a symbol decoder, the

reliable symbol detector to identify which of the captured samples are likely to be located within

a correct decision region of a constellation notwithstanding ISI effects of the channel, the ISI

estimator to estimate the ISI effects based on the symbols so identified by the reliable symbol

detector and the symbol decoder to generate decoded symbols from captured samples using

estimated ISI effects".

None of these references taken either alone or in combination with the prior art of record

discloses a computer readable medium having instructions stored thereon that, when executed by

processing unit, causes a symbol estimation method to be executed in a communication system

for transmitting symbols of a high order constellation, specifically the process including:

(Claim 59) "revising the estimated ISI coefficients based on the decoded symbols and

corresponding received sample values, wherein a contribution of each symbol-sample pair to the

revision is weighted according to reliability factors of the respective captured sample".

None of these references taken either alone or in combination with the prior art of record

discloses a framing method for a communication processing system for transmitting symbols of a

high order constellation, specifically the process including:

(Claim 73) "calculating a reliability factor of a candidate sample from values of a

plurality of estimated symbols in proximity to an estimated symbol that corresponds to the

candidate sample,

if the reliability factor is less than a predetermined limit, designating the candidate

sample as a reliable symbol".

7.   Any comments considered necessary by applicant must be submitted no later than the

payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for

Allowance."

8.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is

571-272-3717. The examiner can normally be reached on Monday through Friday from

8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Leo Picard, can be reached on 571-272-3749. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to TC 2100 Group receptionist: 571-272-2100.

K. Thangavelu
Art Unit 2123
January 31, 2006

Paul L. Rodriguez   2/3/06
Primary Examiner
Art Unit 2125